

Amendments to the Drawings:

The attached sheet of drawing includes changes to Fig. 1. This sheet, which includes Fig. 1, replaces the original sheet including Fig. 1, now showing a turbo-molecular pump 90 which continuously exhausts the processing chamber 1 through the exhaust passage 8.

Attachment: Replacement Sheet

REMARKS

By the above amendment, a “,” has been deleted in claim 5 in an attempt to ensure proper consideration for the recited feature of claim 5 that the laser scanner introduces a laser from outside of the processing chamber through the measurement window and the detector detects light which passes through the measurement window. That is, that the same measurement window is utilized for introducing laser light into the processing chamber through the measurement window and for receiving light which passes from the processing chamber through the measurement window through the detector. Further claims 11 and 13 have been amended to clarify features of the present invention.

Also, in view of the objection to the drawing that the “turbo-molecular pump” must be shown or the feature canceled from the claims, submitted herewith is a replacement sheet of drawing for Fig. 1 showing a turbo-molecular pump 90 which continuously exhausts the processing chamber 1 through the exhaust passage 8, where the exhaust rate is adjusted by a butterfly valve 9 as described at page 10, lines 10 - 12 of the specification, noting that the specification has been amended to refer to the turbo-molecular pump 90. Accordingly, applicants submit that the drawing objection should now be overcome.

As to the rejection of claims 5, 11 and 12 under 35 USC 103(a) as being unpatentable over Tsukazaki et al (US 5,837,094) in view of Gupta et al (US 6,125,789 A) and Hamelin et al (US 6,951,821 B1) and the rejection of claims 8, 9 and 13 under 35 USC 103 over Tsukazaki et al in view of Gupta et al, such rejections are traversed and reconsideration and withdrawal of the rejections are respectfully requested.

At the outset, applicants note that applicants consider an interview with the Examiner may be helpful in resolving any outstanding issues, and it is requested that the Examiner contact the undersigned attorney to schedule an interview upon taking this application up for action.

Turning to Tsukazaki et al, as recognized by the Examiner, this patent discloses as illustrated in Fig. 1 and described in column 1, lines 48 - 50, a particle monitor 15 including a laser irradiation system 15a, a detector 15b, and windows 15c and 15d. As illustrated in Fig. 1 and described in column 3, lines 1 - 15 of Tsukazaki et al, the particle monitor 15a irradiates the fine particles passing through the exhaust pipe 12 by passing laser irradiation through the window 15c and the detector 15d detects light scattered from the particles in the exhaust pipe 12, which scattered light is passed through the window 15d for detection by the detector 15b. Thus, in accordance with the disclosure and teaching of Tsukazaki et al, two separate windows 15c and 15d, which are arranged at positions spaced from one another are utilized, wherein the irradiating laser passes through the window 15c for irradiating the particles in the exhaust pipe 12 and scattered light from the irradiated particles pass through the separate window 15d for detection by the detector 15b. Thus, irrespective of the contentions by the Examiner, Tsukazaki et al does not disclose or teach the recited features of claim 5 of “the processing chamber being provided with a measurement window formed on a wall surface” (emphasis added),. and “a particle detector having a laser scanner and a detector which are installed outside of the processing chamber, the laser scanner introducing a laser from outside of the processing chamber to inside of the processing chamber through the measurement window so as to scan a laser beam in a plane inside of the processing chamber an outside of a region where the plasma is generated, and the detector detecting light

which is scattered from a particle crossing the plane while the laser beam scans in the plane and which passes through the measurement window. (emphasis added). That is, as recited in claim 5, the laser light is introduced to the processing chamber through the same measurement window through which detected light passes, which feature is directly contrary to the disclosure and teaching of Tsukazaki et al. Thus, applicants submit that independent claim 5 and its dependent claims patentably distinguish over Tsukazaki et al in the sense of 35 USC 103 and all claims should be considered thereover.

Applicants note that independent claim 8 recites substantially the same features of a measurement window formed on a wall of the chamber and that “the particle detecting unit introduces the laser beam from outside of the processing chamber to inside of the processing chamber through the measurement window, and monitors the light scattered from the particle crossing the plane of the processing chamber and passing outside of the processing chamber through the measurement window.” (emphasis added). Hereagain, it is apparent that such feature is contrary to the disclosure and teaching of Tsukazaki et al, and applicants submit that claim 8 and its dependent claims patentably distinguish over Tsukazaki et al in the sense of 35 USC 103 and all claims should be considered allowable thereover.

With respect to dependent claims 12 and 13, which depend from claims 5 and 8, respectively, and recite the feature that a laser scanner and a detector are arranged at a substantially same position outside of the processing chamber with respect to the measurement window, applicants submit that the recited feature is diametrically opposed to the disclosure and teaching of Tsukazaki et al, which requires two windows at opposite sides of the exhaust pipe 12 and a laser irradiator 15a and a detector 15 b arranged at substantially opposite positions with respect to

the exhaust pipe 12. Thus, these dependent claims, when considered in conjunction with the parent claims further patentably distinguish over Tsukazaki et al in the sense of 35 USC 103.

The Examiner has recognized some deficiencies in Tsukazaki et al and has cited Gupta et al and Hamelin et al in an attempt to overcome such deficiencies relating to a turbo-molecular pump through an exhaust passage equipped with a butterfly valve. More particularly, the Examiner contends that Gupta et al teaches a similar apparatus "(Fig. 1B, Fig. 3B) including a scanning (335; Fig. 3B) laser system (330, 335; Col. 8, line 41-col. 9, line 23) for particle detection and processing" and that Hamelin et al teaches a wafer processing system/unit "(Fig. 2, 3) including a vacuum pumping system/unit (280; Fig. 2) comprising a mechanical booster vacuum pump, or equivalently, a turbo-molecular vacuum pump (TMP, Figs. 2, 3; col. 89, lines 60 - col. 10, line 4). Hamelin further teaches a butterfly valve (not shown; col. 9, line 60 - col. 10, line 4) constituting his vacuum pumping system/unit (280; Fig. 2; col. 9, line 60 - col. 10, line 4)". The Examiner contends that it would be obvious to combine the references to provide the claimed features.

Contrary to the position set forth by the Examiner, applicants note that Gupta et al, like Tsukazaki et al has clearly illustrated in Fig. 3B thereof, discloses the utilization of two separate windows 341 and 343. More particularly, as illustrated in Fig. 3B and clearly described in column 8, lines 32 - 40, "Laser light from a laser 330 is directed through a scanner 335 that spreads the laser light throughout a volume, as previously described. The laser light is then directed along a light path 340, entering chamber 15, through a first window 341 in chamber wall 15a, scattering off of particles 300 and exiting through a second window 343. The scattered laser light is then detected using a photo sensor apparatus 345." (emphasis added). As is

readily apparent, from Fig. 3B, the two separate windows 341 and 343 are arranged at substantially opposite positions with respect to the chamber wall 15a, and the laser and scanner 330, 335 are arranged with respect to the entry window 341 and the detector 345 is arranged with respect to the exit window 343 at a substantially opposite position with respect to the laser and scanner. Although Gupta et al suggests that the two windows could be combined into a single window, it is readily apparent that such combination also results in essentially two different portions of the single window being utilized, one portion for entry and another opposite portion for exit. In any event, Gupta et al, like Tsukazaki et al fails to disclose or teach the further features of dependent claims 12 and 13 that the laser scanner and detector are arranged at a substantially same position outside the chamber with respect to the measurement window, and hereagain, Gupta et al provides a disclosure and teaching diametrically opposed to the claimed features. Thus, applicants submit that claims 5 and 8 and the dependent claims further patentably distinguish over the proposed combination of Tsukazaki et al and Gupta et al in the sense of 35 USC 103 and all claims should be considered allowable thereover.

Turning now to Hamelin et al, although the Examiner contends that this patent discloses a turbo-molecular vacuum pump and a butterfly valve with the Examiner referring to "col. 9, line 60 - col. 10, line 4" of Hamelin et al, applicants submit that Hamelin et al fails to overcome the deficiencies of Tsukazaki et al and Gupta et al as pointed out above with respect to the measurement window and the location of a laser scanner and detector with respect thereto, and while Hamelin et al provides a disclosure of a turbo-molecular vacuum pump 252 and a gate valve 254, there is no disclosure of a butterfly valve, irrespective of the contentions by the Examiner. However, the combination also fails to provide the claimed features of claims 5 and 8

and the dependent claims, as pointed out above. Thus, applicants submit that all claims patentably distinguish over this proposed combination of references in the sense of 35 USC 103 and should be considered allowable thereover.

With regard to the Examiner's apparent contention that the claim requirement of claim 11 of "and the plasma is generated after the processing chamber has been evacuated" is a claim requirement of intended use and is apparently not given patentable weight, applicants note that independent claim 5 recites the feature of "a plasma generator for generating plasma in the processing chamber after the gas has been injected into the processing chamber by the use of the gas injector" and represents a functional limitation of the plasma generator and dependent claim 11 has been amended to recite the further limitations of "the plasma generator generates the plasma after the processing chamber has been evacuated", which are functional limitations which must be given consideration in accordance with MPEP §2173.05(g), and as recognized by the Examiner, the cited art fails to disclose or teach this functional limitation.

For the foregoing reasons, applicants submit that all claims present in this application patentably distinguish over the cited art and all claims should be considered allowable thereover. Accordingly, issuance of an action of a favorable nature is courteously solicited.


Applicants again request the Examiner to contact the undersigned attorney to schedule an interview prior to taking this application up for action.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 501.43537X00),
and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

/Melvin Kraus/ 
Melvin Kraus
Registration No. 22,466

MK/jla
(703) 312-6600